



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

Date: November 9, 1971

Reply to
Attn of: W514

Subject: Transmittal Memorandum for Engineering Handbook No. 8, Issuance 71-11

To: All Regional Headquarters, Area Electronic Supervisors, and Electronics Technicians

1. Material Transmitted:

Engineering Handbook No. 8 - Surface Equipment, Section 2.3; Radiation Equipment Maintenance Note No. 8, Test Box for the A232 Totalizing Indicator. Radiation Equipment Maintenance Note No. 9, Solid State Amplifier for the A232 Totalizing Indicator.

2. Summary:

Maintenance Note No. 8 informs technicians of the test box availability and the procedure to be followed for checking the operation of the A232-1 Magnetic Amplifier and the A232-1A Solid State Amplifier in the A232 Totalizing Indicator.

Maintenance Note No. 9 informs technicians of the replacement amplifier to be used in the A232 Totalizing Indicator.

3. Effect on Other Instructions:

This issuance affects EHB-1, Section A, Radiation, Page A-3 to reflect the new stock description for A232-1A

J. A. Cunningham
Chief, Engineering Division

RADIATION MAINTENANCE NOTES
(For Electronics Technicians)

8. Test Box for the A232 Totalizing Indicator.

A test box for checking the operation of the A232-1 magnetic amplifier and the solid state A232-1A amplifier in the A232 Totalizing Indicator has been obtained. One test box will be provided to each AES. The ELTEC should request the test box from his AES if and when required. The test box will enable the technician to make a check of the amplifier and give positive information concerning its condition.

The test box has four jacks that are colored black, green, and red. The two black jacks are connected together. The green and red jacks are used for the positive leg of the circuit. The test cable provided must be connected color to color because of polarization. The value of the 5000-ohm resistor in the test box provides a 100:1 ratio with the 50-ohm potentiometer in the A232 indicator. This allows use of the 2.5V dc scale on the Triplet 630L or 630PL meter to indicate the operating point in millivolts. (Meter indication divided by 100.) The 100 microamp scale on the meter should not be used because of excessive loading thus giving an erroneous indication.

The turn-on point of the magnetic amplifier should not be less than 2.5 millivolts and the turn-off point not less than 2.0 millivolts with a line voltage of 105-125V ac. (NOTE: Line voltage will affect the operating point.) The maximum turn-on point should not exceed 6.5 millivolts. With a 6.5 millivolt signal applied to the amplifier, the turn-on time should not be more than 5 seconds. When the signal is removed the turn-off time should not exceed 6 seconds. The turn-on point of the solid state A232-1A amplifier is 2 millivolts. The turn-off point should not be less than 1.95 millivolts. The voltage points for the solid state unit are adjustable, but there is no time lag for turn-on or turn-off.

Procedure for checking the A232-1 magnetic amplifier and the A232-1A solid state amplifier:

1. Remove the input leads from terminals 1, 2, and 3 on the rear of the A232 indicator.
2. Set the meter to the 2.5V dc range.

3. Connect the meter into the test box at the red and black jacks as shown on the schematic.
4. Turn the test box potentiometer fully counterclockwise.
5. Connect the test cable into the green and black jacks on the test box as shown on the schematic.
6. Plug the telephone-type plug into J1 of the A232 indicator as shown on the schematic.
7. Turn the test box potentiometer clockwise very slowly until the white light, L1, on the A232 indicator comes on. Read the meter voltage and divide it by 100. This is the required millivolts to cause the amplifier to activate. Turn the test box potentiometer counterclockwise until the white light, L1, goes off. Read the meter voltage required to deactivate the amplifier. These voltages and time periods should occur as indicated in the general write-up of this maintenance note.

If a magnetic amplifier fails to operate within the limits prescribed in this maintenance note, the Weather Service Headquarters, W514, should be advised so that a replacement can be obtained.

Attachment: 1 Drawing

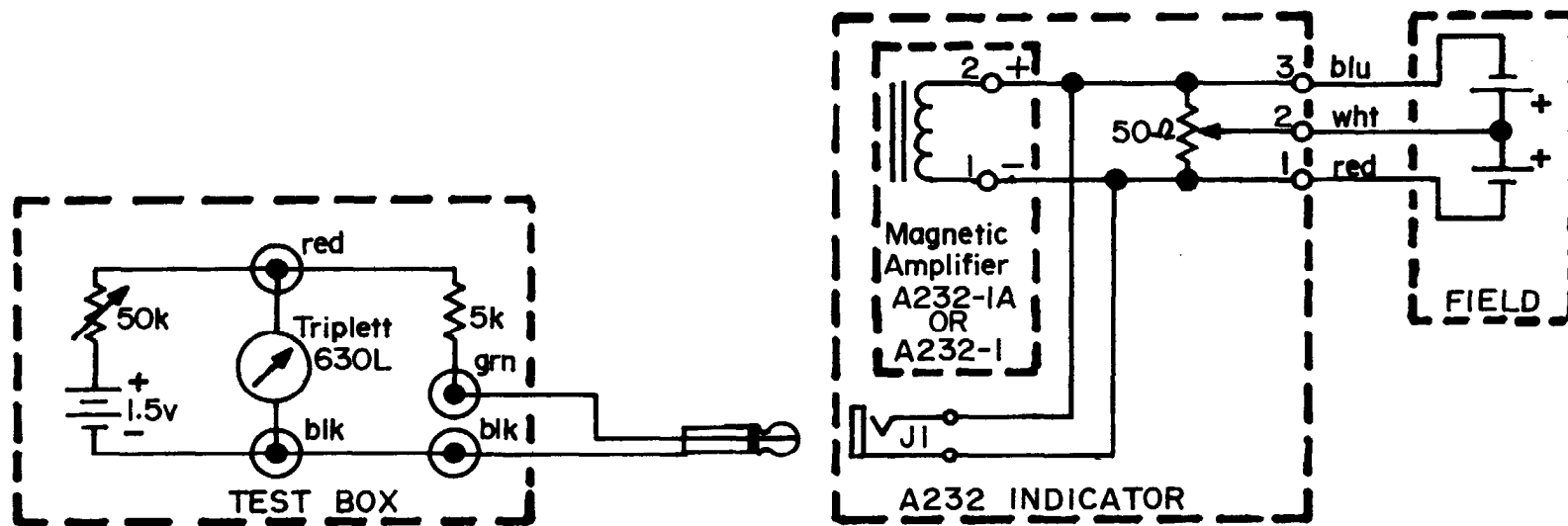


Figure 1-A232 TEST BOX

RADIATION MAINTENANCE NOTES
(For Electronics Technicians)

9. Solid State Amplifier for the A232 Totalizing Indicator.

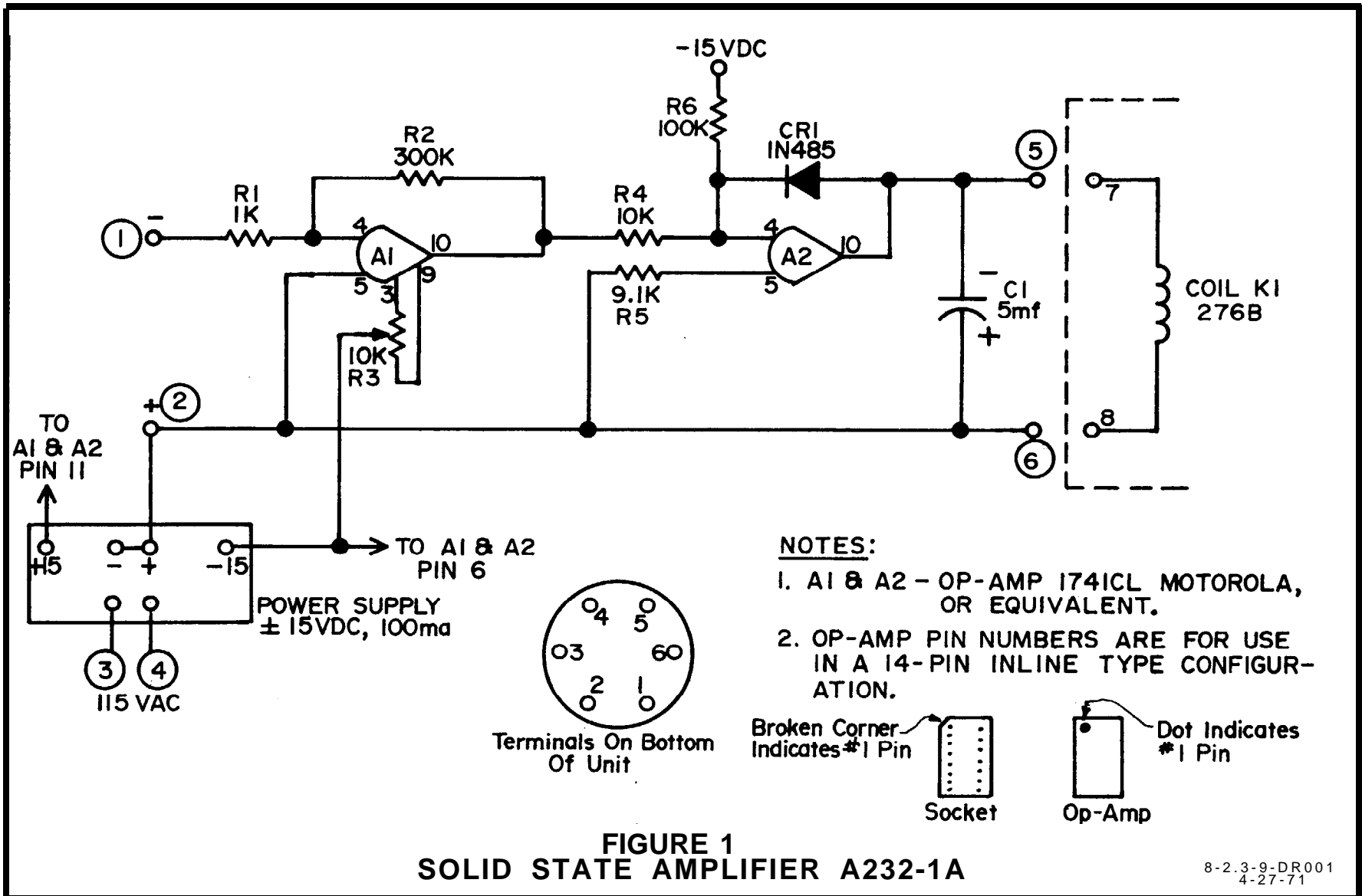
The Magnetic Amplifier, WS Stock Number A232-1, is no longer available and has been deleted from the Instrumental Equipment Catalog. The replacement amplifier A232-1A (FSN not assigned) is a solid state unit that will fit into the A232 panel without any alterations. The item will be supplied from the CLSC, Kansas City, Missouri, upon request, for replacement of a defective A232-1. Order as: Amplifier, solid state.

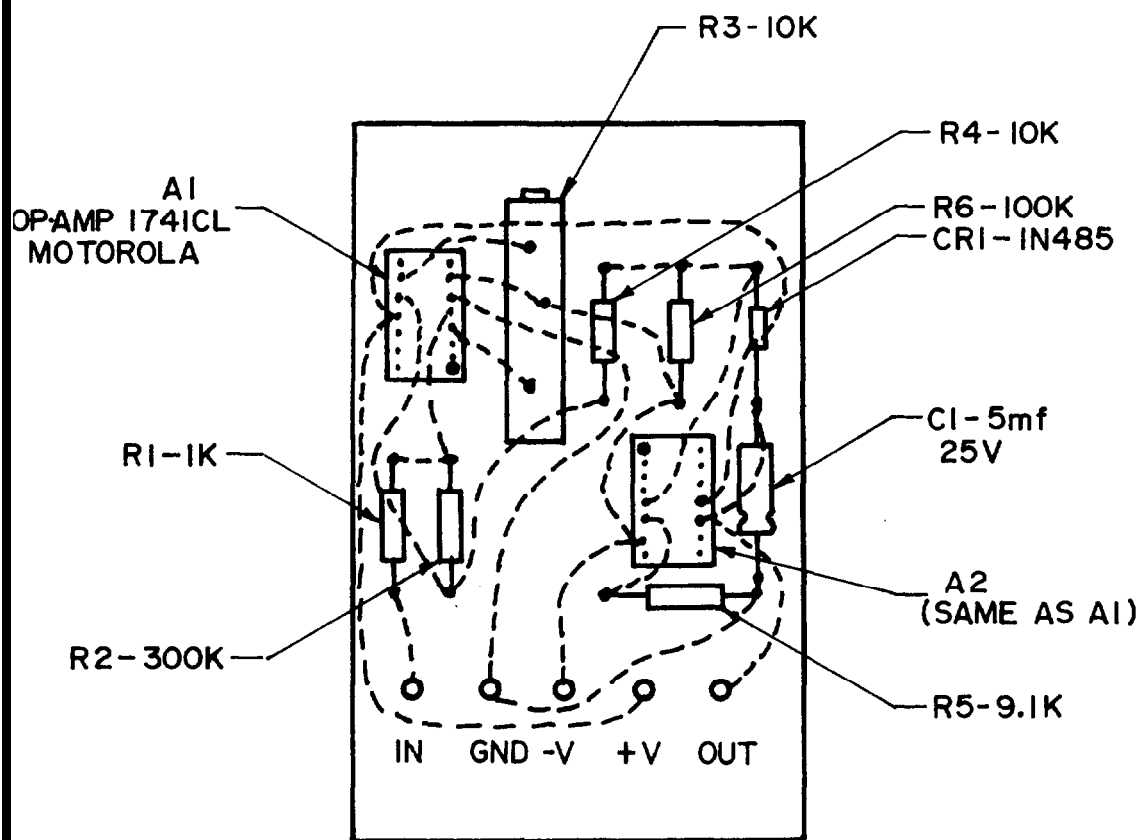
The amplifier has its own ± 15 -volt dc power supply and one printed circuit card. The components are standard items that can be procured locally. The board is marked on the back side for test points to indicate the plus and minus voltage, input, output, and ground. The bottom pin connections are marked and are the same as on the magnetic-type amplifier. The trim pot has been set to activate the amplifier with a 2mv. input. The trim pot should not be adjusted for any reason, except when performing a test or checking an inoperative amplifier. This should only be done when the A232 Test Box is available. (See Radiation Maintenance Note No. 8.)

Two copies of the schematic diagram of the amplifier are attached. One copy should be removed from this Maintenance Note and inserted in the Instruction Manual No. 8-305, Instructions for Installing and Operating U.S. Weather Service Photoelectric Sunshine Switch in Conjunction with Sunshine and Precipitation Indicator, dated August 15, 1963. The other schematic should stay with this Maintenance Note.

Attachments: (2 EA. of Figure 1
(1 EA. of Figure 2
(1 EA. of Photograph 8-2.3-9-DR003)

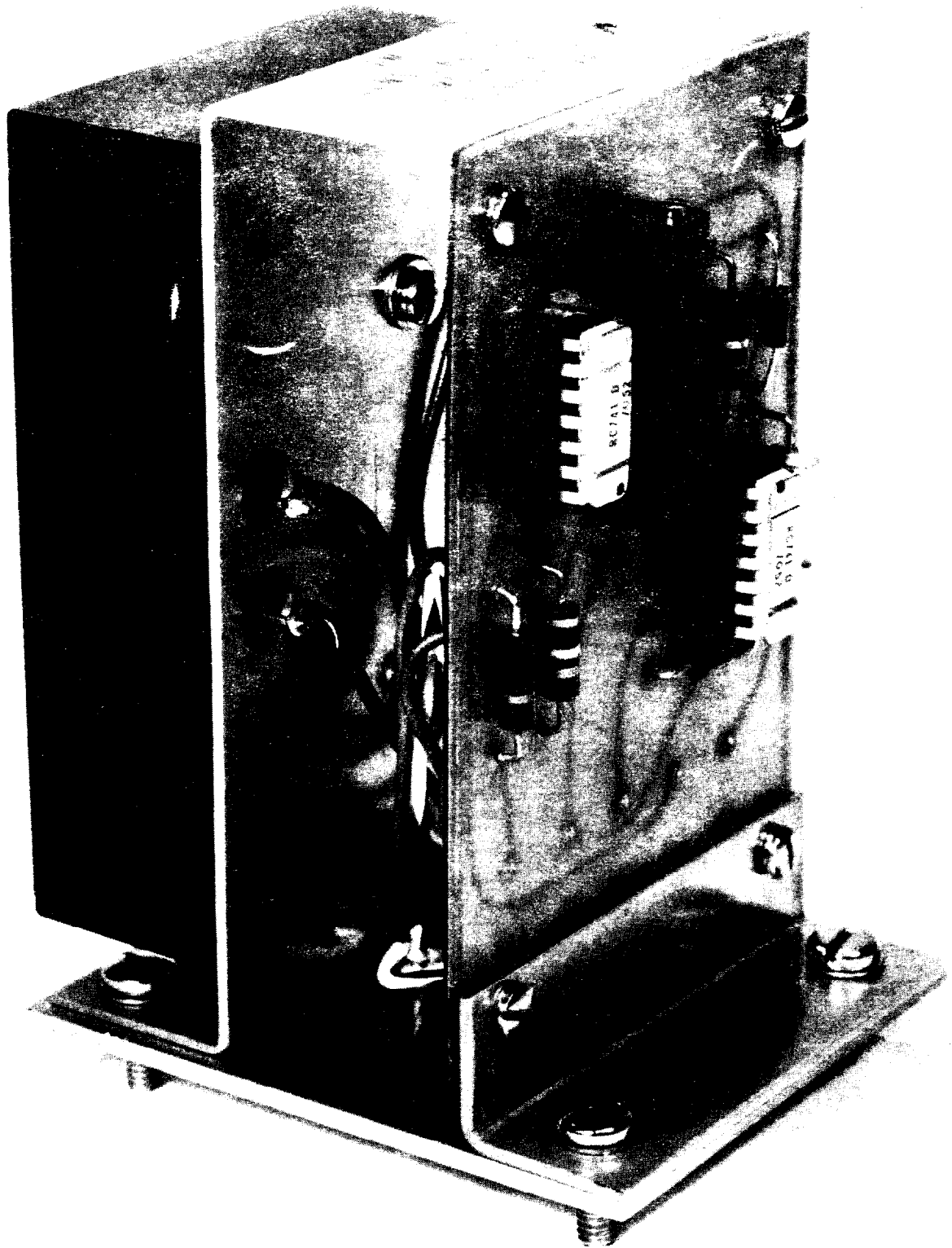
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11-9-71





ALL RESISTORS ARE 1/4 W.

FIGURE 2
SOLID STATE AMPLIFIER A232-1A





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

W/OS0321 - FLP

April 20, 1987

TO: All NWS Regional Headquarters, Area Electronics Supervisors, and
Electronics Technicians (EHB-8 Distribution)

FROM: W/OS03 - J. Michael St. Clair *J. M. St. Clair*

SUBJECT: Transmittal Memorandum for Engineering Handbook No. 8, Issuance 87- 5

1. Material Transmitted:

Engineering Handbook No. 8, Surface Equipment, Section 2.3; Maintenance Note 17: Solar Radiation Personal Computer System Technical Information Package.

2. Summary:

Maintenance Note 17 provides information for the installation and maintenance of the Solar Radiation Personal Computer system.

3. Effects on Other Instructions:

Delete Maintenance Notes 10 through 16, EHB-8, section 2.3.

Delete Modification Notes 1, 2 and 4, EHB-8, section 3.3.

Delete Maintenance Schedules for the Monitor Labs 5130 Integrating Printer, EHB-8, section 4.3.

Make pen-and-ink changes to the affected index pages in EHB-8, sections 2.3, 3.3, and 4.3.

Pen-and-ink change - Delete Manual 8-315, Integrating Printer, Model 5130A, section 1.3.

EHB- 8
Issuance 87- 5



MAINTENANCE NOTE
(for Electronics Technicians)

17. Solar Radiation Personal Computer System Technical Information Package.

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INTRODUCTION

1.1 Background

The Monitor Labs 5130 Integrator/Recorder systems in the NOAA Solar Radiation Monitoring Network are being replaced with an IBM Personal Computer (PC)-based system. The Solar Radiation Personal Computer (SRPC) system is designed for data collection and on-station quality control checks. Stations having an IBM-PC ART will transmit daily solar radiation data, via the AFOS network, directly to the National Climatic Data Center (NCDC). Stations not in the AFOS network will mail archived solar radiation data diskettes to the NCDC every week.

1.2 Safety Guidance

Follow established guidelines.

2. INSTALLATION

2.1 Delivery Schedule

The 31 network stations have received the SRPC equipment. Installation and checkout should start as soon as possible after receiving this Technical Information Package (TIP).

The SRPC system shipment consists of:

<u>QUANTITY</u>	<u>EQUIPMENT</u>
1	IBM-XT or IBM-PC Microcomputer
1	Keyboard
1	Monochrome Display Monitor
1	Hercules Graphics Board
1	DASCON-1 Data Acquisition Board
1	Screw Terminal Accessory Board
1	Ribbon Cable
1	DASCON-1 Manual
1	IBM Guide to Operations Manual
1	DOS Version 3.0 or 3.10 Software Diskette
1	Calibration Routine Diskette
2	Amplifier Chips (U31, U32)
2	Transient Voltage Suppressor Diodes

Network Locations:

Eastern Region

Burlington, VT
 Caribou, ME
 Pittsburgh, PA
 Raleigh, NC
 Sterling, VA

Central Region

Bismarck, ND
 * Boulder, CO
 Columbia, MO
 Dodge City, KS
 Grand Junction, CO
 Lander, WY
 Madison, WI
 Omaha, NE

Southern Region

Albuquerque, NM
 Brownsville, TX
 El Paso, TX
 Lake Charles, LA
 Midland, TX
 Montgomery, AL
 Nashville, TN
 Tallahassee, FL

Western Region

Boise, ID
 Ely, NV
 Fresno, CA
 Great Falls, MT
 Las Vegas, NV
 Los Angeles, CA
 Phoenix, AZ
 Salt Lake City, UT
 Seattle, WA

Pacific Region

Guam, Mariana Island

* - ERL/ARL Station

2.2 General Criteria

The IBM PC should be located in the weather service office. The PC should not be exposed to temperature extremes, high humidity, or dusty environments. The regions have been funded for computer furniture and expendable supplies.

The sensors should be located as required by NWS Observing Handbook 3.

2.3 Physical Characteristics

The SRPC system is basically an IBM PC configured with an internal data acquisition board, monitor, keyboard and a small external screw terminal accessory board. The existing sensors will be used with the SRPC system.

2.4 Power Requirements

The IBM PC requires 110 volts AC (200 W). The IBM is equipped with a line cord designed for the user's safety. A properly grounded power receptacle with a transient eliminator should be used for equipment protection. The regions have been funded for the purchase of a transient eliminator for each network station.

The pyrliometer sensor requires 115 volts AC power at the sensor site.

2.5 Interface Requirements

The sensor outputs are in the millivolt range. To reduce noise interference, all signal lines should be 22-gauge, twisted pair, shielded cable. The signal lines are protected by transient voltage suppressor diodes located in the Screw Terminal Accessory Board.

2.6 Installation Procedure

2.6.1 IBM PC Configuration

Instructions for the IBM PC system unit cover removal are given in figure 1.

The switch block located on the motherboard of the IBM-XT or IBM-PC should be set as listed below. Switch locations and settings are shown in figure 2 (IBM-XT) and figure 3 (IBM-PC).

<u>IBM-XT</u>		<u>IBM-PC</u>	
Switch Block 1	Switch Block 1	Switch Block 1	Switch Block 2
1 - Off	1- Off	1 - On	
2 - On	2- Off OK	2 - Off	
3- Off	3- Off	3 - Off	
4 - Off	4 - Off	4 - On	
5 - Off	5- Off	5 - On	
6 - Off	6- Off	6 - Off	
7 - Off	7 - Off	7 - Off	
8 - On	8 - On	8- Off	

Install the Hercules Graphics board in slot #5 of the IBM chassis.

Use the IBM Guide to Operations manual furnished with the PC, and complete the PC system cabling.

2.6.1.1 IBM PC Diagnostics

For these tests you will need the IBM Guide to Operations manual furnished with the PC and the diagnostic diskette located in the rear of the manual.

1. Use the instructions on pages 1-16 through 1-23 of the IBM Guide and complete the power-on self test and screen alignment procedure.
2. From the screen, select option 0 and press the ENTER key. The devices in the system should be:

System Board
256 KB Memory
Keyboard
Monochrome and Printer Adapter
2 Diskette Drivers and Adapters

If not, check connections, and initialize the system again. When correct, type Y; press ENTER.

3. Type 0 and press ENTER. The KEYBOARD TEST is self-explanatory. All keys should be checked for proper operation. To exit, type Y; press ENTER. Turn off the system and remove the diskettes.

The performance of the CPU, memory, keyboard, diskette drivers, and monitor has now been verified. If any additional troubleshooting of the IBM system is required, follow the instructions in the IBM Guide and on the Diagnostic Diskette. Major problems should be referred to Mike Rigney (FTS) 427-7724, (COMM) 301-427-7724.

After completing the diagnostics, it is recommended that backup copies be made of the three main programs in this system. (See 5.2.2.4.)

2.6.1.2 DASCON-1 Configuration

Set the channel select slide and DIP switches on the DASCON-1 board as listed below. Switch locations are shown in figure 4.

<u>Base Address</u>	<u>Input Filters</u>	<u>Analog Input CH0 Gain</u>	<u>Analog Input CH1 Gain</u>
1 - Off	1 - Off	1 - Off	1 - Off
2 - Off	2 - Off	2 - On	2 - On
3 - On	3 - On		
4 - On	4 - On		
5 - On			
6 - On			

Clock Pulse Output Rate - Set to 1 minute

Priority Interrupt' Level - Set to 3

NOTE: Do not install the DASCON-1 board at this time.

2.6.1.3 Accessory Board Configuration

J3 on the Screw Terminal Accessory board must be jumpered as listed below. Figure 5 shows the jumper locations.

Jumpers

PB7	to	R/H
6	to	LD ADD
5	to	CH AD1
4	to	CH AD0
<u>PC0</u>	to	BSY
CLK	to	IRQ IN

Jumper and solder CH0 L0 to CHD LLGND and CH1 L0 to CH1 LLGND at the J6 terminal strip, as shown in figure 5.

Install the DASCON-1 Data Acquisition board and card guide in slot #1 of the IBM chassis. Do not install the card retaining screw at this time. The remaining hardware packed with the card guide is not used and may be discarded. Connect one end of the ribbon cable to the Screw Terminal Accessory board, as shown in figure 5; the other end of the ribbon connector connects to the DASCON-1 board (slot #1).

Initial calibration of the DASCON-1 board must be done at this time.

No sensors should be connected. The system hardware configuration will be changed during this routine. Each test has instructions describing the hardware changes required. Proceed as follows:

1. Insert the CAL.BAS diskette in Drive A and turn on the system unit.
2. Follow the screen instructions and set the correct time and date. Use Local Standard Time.
3. Select Test 1 (A/D CONVERTER) and follow the instructions and prompts.

Before selecting Test 2 (INSTRUMENTATION AMPLIFIERS), turn off the system unit. Remove the DASCON-1 board from slot #1. Install the two amplifier chips, U31 and U32, with the notched side of the chips facing the bottom of the board. Replace the DASCON-1 board in slot #1 and install the retaining screw. Turn on the system unit.

4. Select Test 2, and follow the prompts. Select gain 100 for channels 0 and 1. After completing Test 2, remove the CAL.BAS diskette from Drive A.
5. Turn off the system unit.
6. Reconnect wires PB7 and PB6 to the J3 terminal in the Screw Terminal Accessory board that were removed during Test 1 (A/D CONVERTER).
7. Remove the jumpers that short CH0 HI to CH0 LLGND, and CH1 HI to CH1 LLGND.

This completes the calibration of the DASCON-1 Data Acquisition board. The sensor connections can now be completed.

2.6.2 Sensor Connections

2.6.2.1 Global Pyranometer

Connect the sensor input cable and the voltage suppressor diode to the J6 terminal on the Screw Terminal Accessory board as listed below. Figure 5 shows the terminal location and connections.

CH0 HI - Signal input
CH0 L0 - Signal ground
LLGND - Cable Shield

CH0 HI - Banded side of transient voltage diode
LLGND - Other side of diode

2.6.2.2 Direct Pyrheliometer

Connect the sensor input cable and the voltage suppressor diode to the J6 terminal on the Screw Terminal Accessory board as listed below. Figure 5 shows the location and connections.

CH1 HI - Signal input
CH1 LO - Signal ground
LLGND - Cable shield

CH1 HI - Banded side of transient voltage diode
LLGND - Other side of diode

Replace the Screw Terminal Accessory board and IBM PC covers.

The system installation and equipment checkout is now complete. Data collection can now begin.

The sun sensor data acquisition is initiated by loading the diskette labeled SOLAR SYSTS.

1. Insert the SOLAR SYSTS diskette in Drive A, and a formatted blank diskette (see 5.2.2.3) in Drive B.
2. Turn on the system unit. The system will boot up from the diskette in Drive A, and the program will automatically begin running.

3. MAINTENANCE

3.1 Maintenance Responsibilities

Upon activation, maintenance of the SRPC system will be the responsibility of the electronics technicians (el techs) at the station, or other el techs so designated by the regional headquarters.

3.1.1 Sensor Repair and Replacement

Sensor repair and replacement are the responsibility of the NOAA Air Resources Laboratory (ARL) at Boulder, Colorado. All sensor problems are to be referred to Don Nelson, (FTS) 320-6662 or (COMM) 303-497-6662.

3.1.2 Sensor Calibration

All pyranometers and pyrheliometers are calibrated by ARL. All sensor calibrations are valid for 3 years from the date on the calibration certificate. ARL will arrange, through National Weather Service Headquarters, for sensor exchange at least every 3 years.

3.2 On-site Repairs

The basic field repair will be fault isolation to the line replaceable unit (LRU), replacement of the LRU, and shipment of the failed LRU to the National Reconditioning Center (NRC).

3.3 Special Tools and Test Equipment

No special tools or test equipment are required for maintenance of the SRPC system. A diagnostic diskette provided in the IBM Guide to Operations manual will aid in the maintenance of the IBM PC.

3.4 Staffing Policies

Replacement of the Monitor Labs 5130 recorder with the SRPC system will not result in any el tech upgradings. Existing grade structures at those stations receiving the equipment will remain the same:

4. LOGISTICS

4.1 On-site Spares

No spares will be stocked on station for the SRPC system.

4.2 Other Spares

All LRU's for the SRPC system are available from the Logistics Support System (LSS) inventory at the National Logistics Supply Center (NLSC). The purpose of LSS is to provide resupply of critical, costly components while maintaining close control of the location of each LRU. This system reduces the time and paperwork involved in requisitioning parts.

Refer to Part 0 of Engineering Handbook 1 (EHB-1) for instructions on LSS requisitioning procedures.

4.3 Equipment Warranty

There are no manufacturer's warranties on the SRPC system.

4.4 Disposition of Replaced Equipment

All Monitor Labs 5130 Integrator/Recorders will no longer be supported by the solar radiation program. Follow NOAA regulations and excess all remaining recorders.

5. DOCUMENTATION

5.1 Equipment Manuals

Each system is shipped with the following equipment manuals:

- 1 Ea. IBM Guide to Operations Manual
- 1 Ea. DASCON-1 Data Acquisition Board Manual

5.2 Special Instructions

5.2.1 Solar Radiation Handbook

The Observing Systems Branch is revising National Weather Service Observing Handbook 3. This revision will be provided to all stations in the solar radiation network.

5.2.2 Software

5.2.2.1 SOLAR SYSTS Program

Each SOLAR SYSTS diskette contains menu-driven instructions, an automatic reboot in case of power failure, and a clear-day quality control model. The quality control model permits an on-station comparison of data collected versus modeled solar radiation. It requires observation inputs of turbidity values, pressure, and any cloud amounts. The model programs are complex and require many calculations. On an IBM-XT it requires 6 minutes to complete and about 7 minutes on an IBM-PC.

The main SOLAR SYSTS program collects two channels of solar radiation values by sampling each minute and storing hourly totals. An interrupt permits the sensor signal to be selected each minute at 00 seconds. At the end of each hour, the totals are displayed and the data saved to the diskette in Drive B. Data are saved for 24 hours on the diskette in Drive A and in a 7-day rotating file on the diskette in Drive B.

The software has been tailored for each station because of different sensor calibration factors. All conversions -- A/D, bits to millivolts, and watt hours per meter squared -- are in the software.

The data logging routine displays a 1-minute bit count. This bit count can be multiplied by .005 to obtain the millivolt input from the sensor. For example, a bit count of 2000 multiplied by the conversion factor of .005 equals a 10.0 mV sensor input. All stations use the same conversion factor. The full sensor input range is 0 - 20.48 mV, and equals a bit count of 0 - 4095. Any count over 4095 will generate an error message on the display. This feature was added so that a daily scan of these values will provide a level of confidence in sensor performance and system operation.

Instructions for accessing the data files will be contained in NWS Observing Handbook 3.

5.2.2.2 Software Backup

The system has three main programs. Backup copies of all program diskettes should be made. The main program diskettes are:

DOS - IBM Operating System
CAL. BAS - Calibration Routines
* SOLAR SYSTS - Data Acquisition Program

* The SOLAR SYSTS program requires two diskettes. The diskette marked SOLAR SYSTS contains the program. The second diskette is a blank formatted disk for data storage in Drive B.

5.2.2.3 Diskette Formatting

Use the following procedure to format blank diskettes.

CAUTION: Any data on the diskette will be destroyed during formatting. DO NOT FORMAT ANY OF THE THREE ORIGINAL PROGRAM DISKETTES.

1. Turn off the system unit and place the IBM DOS diskette in Drive A. This diskette contains the formatting commands and must remain in Drive A until all diskettes have been formatted.
2. Turn on the system unit. The system will boot up and the screen will display "ENTER NEW DATE". Ignore entry and press the ENTER key. The system will respond with "ENTER TIME". Ignore this entry and press the ENTER key. The screen should now display the prompt, "Ax".
3. Type in either lower or upper case the command : FORMAT<sp>B: /S and press the ENTER key.

NOTE: The symbol <sp> used in a command line indicates that a space is required.

4. Place the diskette to be formatted in Drive B and follow the screen prompts. When the formatting is complete, remove the diskette from Drive B. Answer the screen prompt "FORMAT ANOTHER (Y/N)" by typing Y and pressing the ENTER key. insert another diskette and follow the screen prompts. Repeat for all diskettes to be formatted.
5. When formatting is complete, type N to the "FORMAT ANOTHER (Y/N)" prompt. The screen should display the prompt, "A>". Type CLS and press the ENTER key.

Formatting of the diskettes has now been completed.

5.2.2.4 Copying Programs

NOTE: The symbol <sp> used in a command line indicates that a space is required.

The command for copying the main programs is: COPY<sp>*. *<sp>B: This command causes the master in Drive A to be copied in its entirety to the diskette in Drive B. The data on the master in Drive A will not be destroyed.

NOTE: The diskette in Drive B must be formatted before data can be copied onto it.

Use the following procedure to copy all main program diskettes.

1. Turn off the system unit, and place the IBM DOS diskette in Drive A. This diskette contains the copying routine.
2. Turn on the system unit. The system will boot up and the screen will display "ENTER NEW DATE". Ignore entry and press the ENTER key. The system will respond with "ENTER TIME". Ignore this entry and press the ENTER key. The screen should now display the prompt, "A>".
3. Insert a formatted diskette in Drive B. Insert the diskette to be copied in Drive A. Type in the command COPY<sp>*. *<sp>B: with the spaces indicated. Press the ENTER key. The diskette in Drive A will now be copied to the diskette in Drive B. Repeat this step until all program diskettes have been copied.
4. Type CLS; press ENTER key. Label all backup diskettes and file for future use.

5.3 Maintenance Schedule

A maintenance schedule for the SRPC system will be published for EHB-8.

5.4 Instrumental Equipment Catalog

The ordering information for all SRPC LRU's will be added to EHB-1. Until EHB-1 has been updated, use the following part numbers and descriptions when ordering.

<u>WSSN</u>	<u>Description</u>	<u>NSN</u>
A500-1	Microcomputer, IBM-XT, with Hercules Graphics and DASCON-1 boards IBM Model No. 5160	6660-00-875-0000-X

A500-2	Microcomputer, IBM PC, with Hercules Graphics and DASCON-1 boards IBM Model No. 5150	6660-00-395-0000-X
A500-3	Keyboard for IBM PC, IBM P/N 1501100	6660-01-220-9537
A500-4	Monochrome Monitor for IBM PC, Quadram "Amerchrome"	6660-00-721-0000-X
A500-5	Screw Terminal Accessory Board, Model STA-01	6660-00-743-0000-X
A500-5W1	Ribbon Cable, Metra Byte P/N S1800	6660-00-619-0000-X
017S-MPTE5	Voltage Suppressors, use with A500 system	5961-01-193-7309

The SRPC system (A500) consists of the IBM Microcomputer (A500-1 or A500-2), Keyboard (A500-3), Monochrome monitor (A500-4), Screw Terminal Accessory Board (A500-5), and the sensors that have been assigned to the station.

5.5 EMRS Reporting

The SRPC system is reportable equipment. All maintenance should be reported using "SRPC" as the equipment reporting code.

Report activation of the SRPC system using the procedures detailed in EHB-4.

All failed LRU's returned to NRC should have a WS Form A-23 attached. All pertinent information should be entered using the procedures detailed in WSOM Chapter A-14 and EHB-4.

6. TRAINING

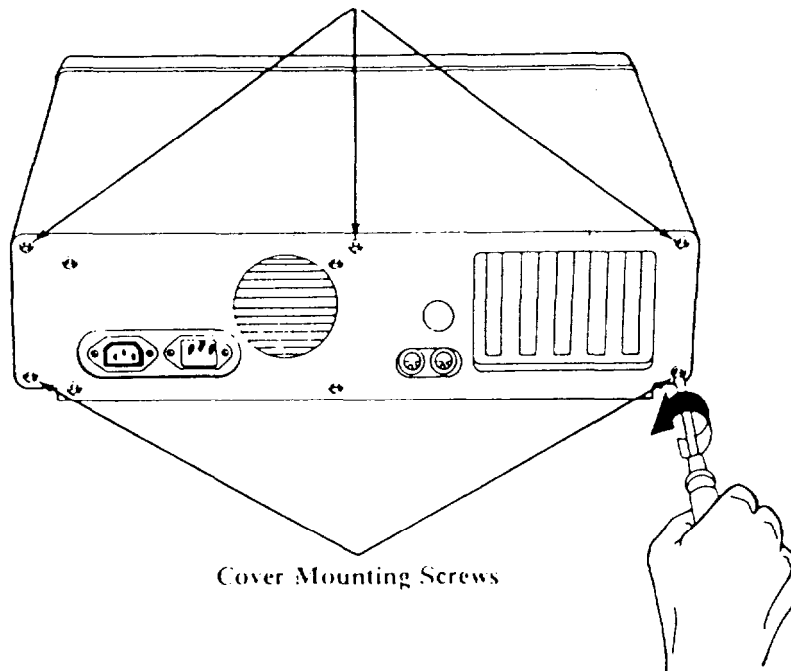
6.1 Formal Training

No resident maintenance training on the SRPC system is planned. A video tape presentation is being developed by the Observing Systems Branch.

6.2 On-the-Job Training

The initial installation and check-out procedures in this TIP should enable the el tech to perform the required field maintenance and repair of the SRPC system.

IBM MODEL PC & PCXT
Cover Mounting Screws



Carefully slide the system unit's cover away from the rear and to the front as indicated in the figure below. When the cover will go no further, tilt it up. remove it from the base and set it aside.

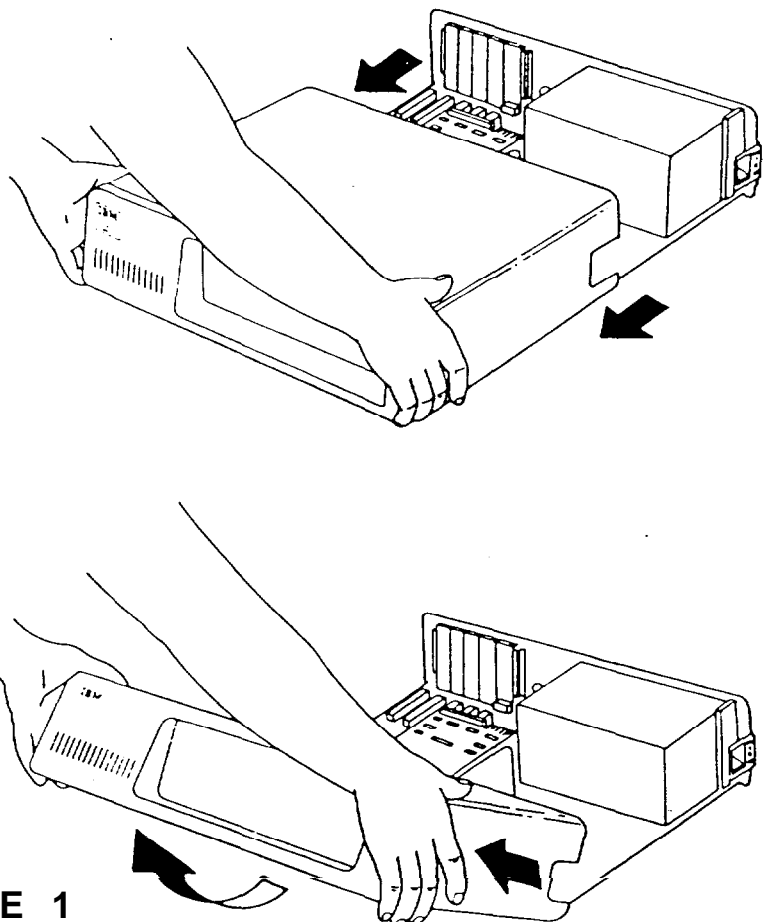


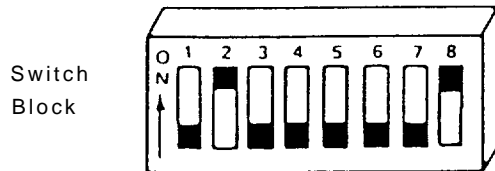
FIGURE 1

Switch Setting Charts

System Board Switch Settings

The switches on the system board are set as shown in the following figure. These settings are necessary for the system to address the attached components, and to specify the amount of memory installed on the system board.

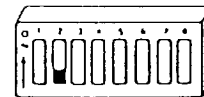
WARNING: Before you change any switch settings, make a note of how the switches are presently set. Use the figure below.



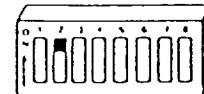
Switch	Function (located on Motherboard)
1	Normal operation must be Off
2	Coprocessor. (not included must be on)
3-4	Amount of memory on the system board.
5-6	Type of display you are using.
7-8	Number of 5-1/4 inch diskette drives installed

Coprocessor

With Coprocessor



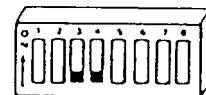
Without Coprocessor



System Board Memory Switch Settings

The following figure shows the settings for switches 3 and 4 for the amount of memory on the system board.

256K



Number of 5-1/4 Inch Diskette Drives Installed

2 Drives



Type(s) of Display(s) Connected

WARNING: If an IBM Monochrome Display is connected to your system, switches 5 and 6 must always be Off. Damage to your display can result with any other switch settings.

IBM Monochrome display or
more than one display

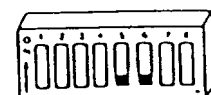
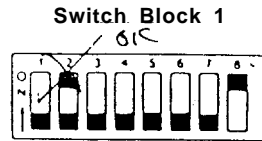


FIGURE 2

Switch Setting Charts

System Board Switches

WARNING: Before you change any switch settings, make a note here of how the switches are presently set.



Switch	Function
1,7,8	Number of 5-1/4 inch diskette drives installed
2	Coprocessor (not included must be off)
3,4	System board memory switches
5,6	Type(s) of display(s) connected <i>OK</i>

Switch Block 2



Switch	Function
1,2,3,4,5	Amount of memory options installed
6,7,8	Always in the Off position

Number of 5-1/4 Inch
Diskette Drives Installed

2 - Drives

Switch Block 1



Switch Block 2



Memory Switch Settings (64 KB-256 KB CPU) System Board

256K, Total Memory



Type(s) of Display(s) Connected

WARNING: If an IBM Monochrome Display is connected to your system, Switch Block 1, switches 5 and 6 must always be Off. Damage to your display can result with any other switch settings.

IBM Monochrome
Display (or IBM
Monochrome Display
plus another display)

Switch Block 1



Switch Block 2



FIGURE 3

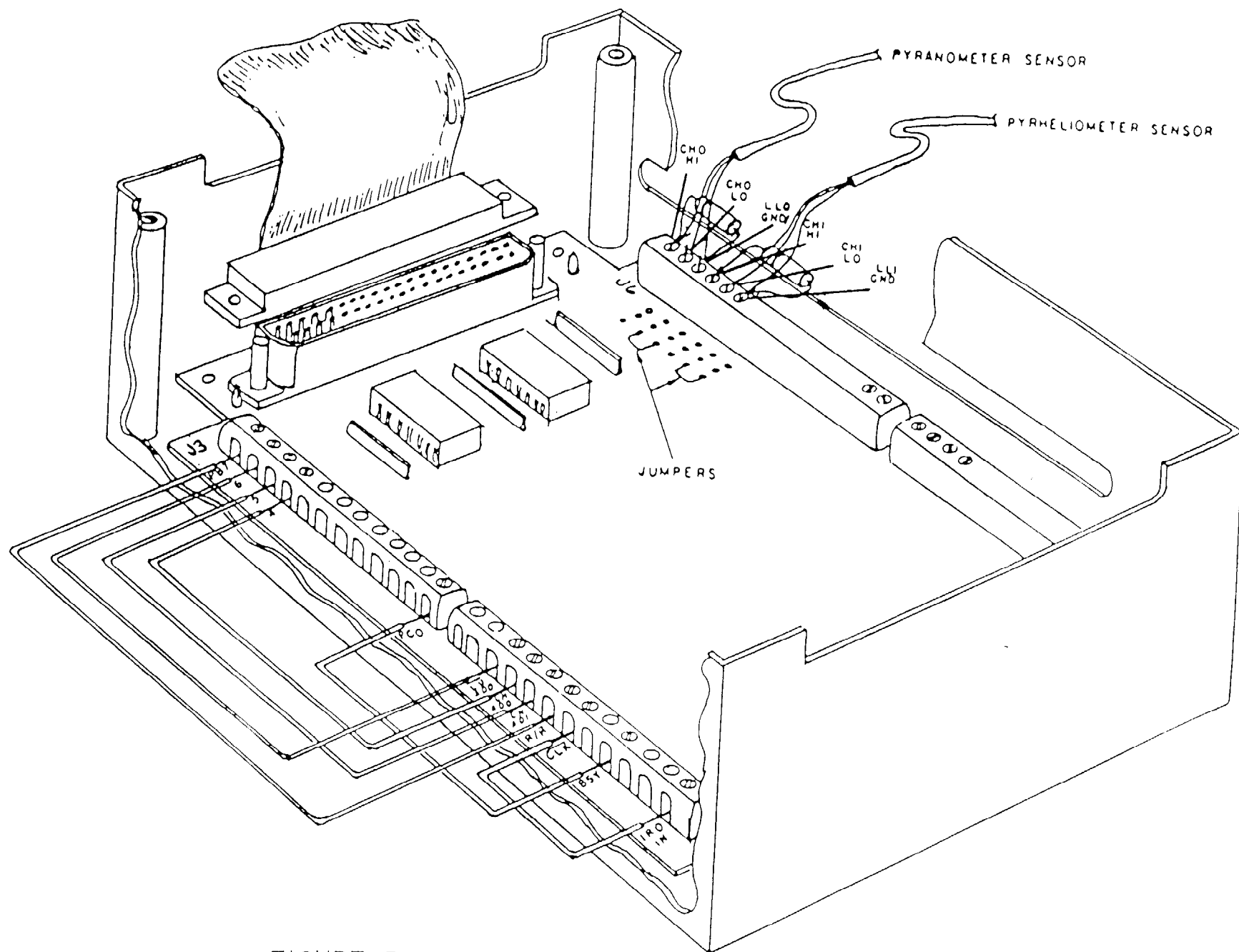


FIGURE 5

<i>Issue Date</i>	<i>Org. Code</i>
1 - 5 - 95	W/OS032

NATIONAL WEATHER SERVICE

Engineering Handbook

<i>Program</i>	<i>Part</i>	<i>Section</i>
EHB-8	02	2.4

MAINTENANCE NOTE INDEX - HO83 HYGROTHERMOMETER SYSTEM

<u>Number</u>	<u>Date of Issue</u>	<u>Title</u>
1	April 4, 1986	Dewpoint Sensor Assembly O Ring Seal Installation
2	July 16, 1986	Transmitter Box Door Seal Repair
	October 7, 1986	Errata Sheet No. 1 to Maintenance Note 2
3	April 18, 1986	HO83 Maintenance Updates--Dewpoint Sensor Mirror Cleaning, Dewpoint Factory Modification, and "O" Ring Inspections
4	November 14, 1986	Installation of Modem
	October 28, 1988	Errata Sheet 1 to Maintenance Note 4
5	April 7, 1987	Addition of a Digital Display of Stock
6	June 25, 1987	HO83 Sensor Optics Alignment
7	September 16, 1988	HO83 Transmitter Door Seal Replacement
8	August 11, 1991	Maintenance of Aspirator Housing and Sun Shield
9	March 4, 1992	Replacement of the HO83 Aspirator Cable
10	March 6, 1992	Use of the Redesigned HO83 Dewpoint Sensor
11	May 7, 1992	HO83 Mirror Cleaning Procedure
12	August 23, 1994	Non-ASOS HO83 Removal at Select Sites



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

W/OTS141: SGW

August 28, 1984

TO: All NWS Regional Headquarters, Area Electronics Supervisors,
and Electronics Technicians (EHB-8 Distribution)

FROM: W/OTS1 - J. Michael St. Clair *J. M. St. Clair*

SUBJECT: Technical Information Package (TIP) for Hygrothermometer
System (H083)

Attached is the Technical Information Package (TIP) for the H083 Hygrothermometer System. The package has been prepared to assist NWS electronics technicians and operations personnel in the installation, maintenance, and operation of the system. A tested alignment procedure is included as an attachment to the TIP. Technical manuals will be forwarded with the H083 system.

Please note that Figures 11 and 12 of the TIP should be completed and returned to W/OTS141 as soon as practicable. Any questions or comments may be communicated directly to Thom Cavanagh at FTS 427-7836.

Attachment
Technical Information Package
for Hygrothermometer System (H083)

cc:
W/OTS2



TECHNICAL INFORMATION PACKAGE
FOR
H083 HYGROTHERMOMETER SYSTEM

July 1984
NWS - OTS
Engineering Division
Field Engineering Support Branch

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Figure 9	Accuracy Specifications
Figure 10	Siting/Exposure of Temperature Sensors
Figure 11	Verification of Installation
Figure 12	Verification of Receipt

Attachment 1	Alignment Procedure
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I. General Information

A. Purpose

The H083 hygrothermometer system is intended to replace all current NWS temperature/dewpoint measuring systems, including H060, H061, H062, and H063 equipment.

The H083 was developed and is being manufactured by Technical Services Laboratory, Inc. (TSL) of Fort Walton Beach, Florida.

B. Delivery of Systems

The initial H083 production system will be made available to NWSTC. Subsequent systems will be delivered to NLSC, with field distribution expected to begin during October 1984.

C. Site Selection

The first 70 to 100 systems delivered will be divided among the NWS regions and deployed at field locations which, based on regional EMRS data, exhibit the highest "down time" rates. Subsequent system deliveries will be based upon NWS-wide EMRS data.

D. Equipment Disposal

Old hygrothermometers being replaced are presently difficult to support. Parts from some of these systems will be required to continue supporting aged equipment until all H083 systems can be delivered. Please refer to Section VI-F for guidelines to be used in disposal of H060, H061, and H062 equipment. Disposition guidelines for H063 equipment have not yet been developed, and will be distributed at a later date.

II. Installation Criteria

A. Physical Characteristics

The H083 hygrothermometer is comprised of three (3) distinct operational units:

1. Aspirator Unit (14" L x 8-1/2" W x 8" D; weight - 8 lbs.)
2. Transmitter Unit (16" L x 14" W x 6" D; weight - 23 lbs.)

3. Display Unit (19" L x 5-1/2" W x 14" D; weight - 9 lbs.)

The Aspirator and Transmitter Units will be located at the field (sensing) location. The Display Unit will be installed in the office equipment rack. In addition, each station will receive a spare parts chest, a mounting hardware kit, and manuals.

B. Receiving Information

Shipment of H083 systems to field sites will be made from NLSC, Kansas City. The entire system will be packed in a single shipping container.

Immediately upon receipt of your system, inspect the container for damage. If damage is found, make the appropriate notations (describing the condition of the container) on all copies of the shipper's waybill. Notify your regional headquarters.

Open the container as soon as practicable and inspect the contents. Using the Inventory Checklist provided herein (Figure 8), verify that your shipment contains all items. (Refer to Section VI.E.3. of the T.I.P.)

C. Mounting Considerations

The H083 is designed such that the Transmitter Unit will mount directly to the existing H060, H061, or H062 support pipe (3" or 4" galvanized stand-pipe). The Aspirator Unit will be attached to the Transmitter Unit housing by struts, which are included as part of the mounting hardware kit.

The Display Unit is designed for a standard 19" equipment rack. The height of the front panel is approximately 5-1/4". Locking slide-mounts are provided.

D. Power Requirements

Both the field and office locations will require 115 a.c. power, 2 amp, single phase. Proper grounding is essential.

E. Interconnections

The interconnecting cable (W1) between the Aspirator and Transmitter Units is provided. Interconnection between the Transmitter and Display Unit (field to

office) can be accomplished with a single cable pair (either existing cable or telephone line). If connection is via direct cable, AWG #22 wire size is recommended as a minimum.

F. Sensor Exposure

Meteorological siting (exposure) guidelines are in effect, and can be found in WSOM Chapter B-11, sections 3.5 and 3.5.1. The guidelines are reprinted herein (Figure 10) for your convenience.

III. Installation

The following guidelines for installation of the H083 system are based upon the criteria detailed in Section II.

A. Pre-Installation

1. Verify that all tools, test equipment, and hardware material required for this installation are available.
2. De-activate and remove the present hygrothermometer configuration, leaving only sufficient lengths of existing power and signal cabling as deemed appropriate. New cabling may be installed, if necessary. (Refer to Figure 5 for cable terminations.)
3. Disposal instructions for old systems are provided in Section VI.F. of this T.I.P.

B. Installation Procedure

1. Aspirator Unit

The aspirator housing (shell) is supported by metal struts, as shown in Figure 4. These struts are a part of the mounting hardware kit. The aspirator should be attached to the Transmitter Unit enclosure prior to mounting the entire assembly on the field site support.

2. Transmitter Unit

Mount the Transmitter Unit (with aspirator attached) to the existing 3" or 4" galvanized steel stand-pipe, as detailed in Figure 4. The mounting flange is already secured to the Transmitter Unit housing.

Complete a.c. power and signal pair connections before tightening flange screws. Connect W1 (aspirator cable) to receptacle 1J1 on the bottom exterior of the Transmitter Unit housing. (At this time, since you are already at the field site, you may wish to perform the Transmitter Unit checkout and alignment. If so, refer first to C.1. below, and then to the attached Alignment Procedures.)

3. Display Unit

Install the slide mount assemblies in the desired location in your equipment rack. Place the Display Unit on the slide rollers and push it into the rack until the assembly locks in place.

Connect the a.c. power cable to the rear of the Display Unit (52).

Using the signal connector provided (3P1), fabricate a cable assembly which is suitable for your rack wiring requirements. (Polarity of the signal pair need not be maintained.) Leave sufficient slack in the cabling to accommodate full movement of the Display Unit on its slide mount.

C. Installation Checks

1. Field Location (Transmitter)

After switching power off, release the sensor package from the aspirator shell by removing the knurled captive screw at the side of the shell (Figure 2).

Carefully slide the package down and out of the shell. Examine the surface of the mirror, and clean if necessary. An ideal cleaning procedure is to use freon or alcohol cleaner, and then allow the surface of the mirror to air-dry. An effective cleaning kit is available from NLSC under WS Stock Number M020-5PU3.

Replace the sensor package and apply power to the Transmitter Unit. Verify that the aspirator blower is running and that the direction of air flow is downward through the shell.

After 2 or 3 minutes, check the following power supply voltages.

+	5	vdc	@	2X3-10	±	0.3v
+	12	vdc	@	2X3-6	±	0.5v
-	12	vdc	@	2X3-12	±	0.5v

2. Office Location (Display Unit)

Energize the Display Unit power and verify operation in accordance with the procedure detailed in Section V.

3. Alignment of System

Refer to the alignment procedure (Attachment 1) for complete calibration instructions.

IV. H083 Concepts

A complete theory of operation may be found in Volume II of the Equipment Manual.

A. Sensing

1. The H083 uses a chilled mirror technique in measuring dew-point temperature. This method differs considerably from the lithium chloride Dewcel System utilized in current NWS Hygro-thermometers H060, H061, H062, and H063.

The sensor package in the H083 Aspirator Unit contains a small mirror which is held at precisely the temperature at which a thin film of condensation is maintained on its surface. A thermal unit, controlled by an optical feedback loop, raises and lowers the temperature of the mirror as required to maintain the thickness of the condensation.

The Dewpoint Sensor (RT2) is a highly stable platinum resistor which is imbedded in the body of the mirror. RT2 has a resistance/temperature coefficient of 0.4 ohms per degree Celsius, and measures exactly 100 ohms at 0° C.

2. The Ambient Temperature Sensor (RT1) is identical to RT2, but mounts directly in the path of the aspirated ambient air-flow.
3. The outputs of both sensors are resistance values which are directly proportional to the ambient and dewpoint temperatures. They are connected as feedback resistors for the analog conditioning circuitry.

B. Data Conversion And Transmission

1. The two resistance values are converted into voltage levels (multiplexed alternately as Ta and Td), which are routed to an A/D converter where representative binary values are generated.
2. A microprocessor stores and formats the data and then generates a serial stream of output data suitable for transmission over a single cable pair or telephone line

The data is transmitted in manchester code (600 baud) at a rate of five (5) frames per second. Each frame of data alternately carries the current Ta and Td values.

3. A second microprocessor at the transmitter controls a local receiver and display monitor. This display is intended for use during maintenance of the system.

C. Receiver And Display

1. The serial data stream is received at the Display Unit. A microprocessor stores and averages each frame of data, makes ongoing checks of several accuracy parameters, and routes the processed data to front panel indicators and an output port.
2. Indicators on the H083 Display Unit are as follows:
 - Ambient Temperature (5-minute average)
 - DewPoint Temperature (5-minute average)
 - Max Temperature (since last reset)
 - Min Temperature (since last reset)
3. The output port provides a means of transmitting processed BCD data to external equipment. This function is intended for future operational use.

V. Operating Instructions

A copy of this section should be provided to the station manager (MIC, OIC, HIC) for use in the station duty manual.

A. Introduction

The H083 system is designed for continuous operation, and will normally remain on at all times. For this reason, the main power switch is located on the rear panel of the Display Unit.

Refer to Volume I of the H083 equipment manual set for a description of all operator controls and indicators, and their normal operating status.

B. Equipment Turn-on and Checkout

When power is applied, the data displays will begin updating at 18.75 second intervals and the error indicator will flash for approximately 5 minutes while the data averages build up to normal values. Should the error indicator flash for more than 5 minutes, a technician should be called.

The operator may, at any time, check for proper operation of the digital displays by depressing the digital display switch. At this time, all light segments of each display should illuminate, indicating a value of -188.8. In addition, this test function causes the error indicator to flash.

The dimmer control varies the display intensity from very dim to maximum brightness.

C. Modes of Operation

1. Celsius/Fahrenheit

Data is normally displayed in degrees Celsius. Fahrenheit data may be displayed at any time by depressing the Fahrenheit display switch. When the switch is relaxed, the indicators again will display data in degrees Celsius.

2. Average/Instantaneous

During normal operation, the temperature values indicated on the display represent 5-minute averages of the measured ambient and dew-point temperatures at the sensor location.

An instantaneous mode is available, and is intended for use only during maintenance and calibration procedures. The average/instantaneous control switch is located on the rear panel of the Display Unit.

3. Max/Min Tracking

In order to initiate max/min temperature tracking, the operator must depress the max/min reset switch and the Fahrenheit display switch simultaneously. (The Fahrenheit display switch serves as an enable control for max/min reset.) At this time, the max and min displays assume the current values of the ambient temperature, and will track temperature extremes as they occur.

D. Error Indication

The internal circuitry of the H083 automatically performs a variety of self-checks during normal operation. The illumination of the error indicator should be interpreted by the operator as a signal that unsatisfactory data is being received. The displays will retain the most recent valid data. If the error indication persists, a technician should be consulted for an inspection of the system.

E. Operator Maintenance

All corrective maintenance on the H083 System will be performed by a trained el tech. Routine maintenance activities (checkout, cleaning, etc.) for operators will be detailed in the Maintenance Schedule section of EHB-8.

VI. Maintenance Policies

A. Responsibilities

The NWS Electronics Technician shall be responsible for activation, maintenance, modification, and equipment reporting associated with the H083 hygrothermometer system.

The system will be field repairable at the LRU level. (See Figure 7 for LRU Listing). Discrete chassis components such as switches, lamps, fuses and fuseholders, etc., are field maintenance items. Parts requisitions for H083 LRUs will be under LSS.

B. Spare Parts Complement

A spare parts chest will be provided with each H083 system. Included in the parts chest will be one of each LRU, and at least two of all field repairable parts. Refer to Figure 7.

C. Test Equipment and Tools

No special test equipment or tools are required to install or maintain the system.

D. Warranty Information

The period of warranty is one (1) year from the date of acceptance of each system.

Should claims under the Warranty Clause be required, they must be coordinated with WSH, Engineering Division - W/OTS141. Contact Thom Cavanagh at FTS 427-7836 for each claim. Information needed...

1. Station Name and ID
2. Mailing Address and Phone Numbers (FTS & Comm.)
3. System Serial Number
4. Cause of Failure, if known
5. Description of Failed Part(s)

E. Documentation

1. Equipment manuals will be delivered with each H083 system. The manuals will be Functionally Oriented Maintenance Manuals (FOMM), and are to be supplied in two volumes:

Volume I - Support Volume (2 each)

Volume II - Troubleshooting/Repair Volume (2 each)

2. EMRS code 'H083' will be utilized for all systems. Report activation and all subsequent maintenance activities on the H083 system in accordance with procedures and practices detailed in EHB-4. (Be sure to report de-activation of your old system.)
3. Verification of receipt of each H083 system is required so that Engineering Division can track the equipment. When you receive and unpack your H083, please inventory all items shipped as soon as possible. Complete the attached Verification of

Receipt form (Figure 12), and return it to Engineering Division, W/OTS141-Cavanagh, in the envelope provided.

4. When installation and activation have been accomplished, please forward the attached Verification of Installation form (Figure 11) to W/OTS141.

F. Disposal of H060, H061, and H062 Equipment

1. Each NWS region will retain and store two (2) of each de-activated H060, H061, and H062 system. These may be used as spare stock until the entire deployment of H083 systems is completed.
2. All dewcel assemblies (including spares) from all other deactivated systems will be forwarded to NRC with properly completed H-30 or H-14 Return Tags attached.
3. The remaining hardware will be disposed of in accordance with Regional Administrative Support Center policies.

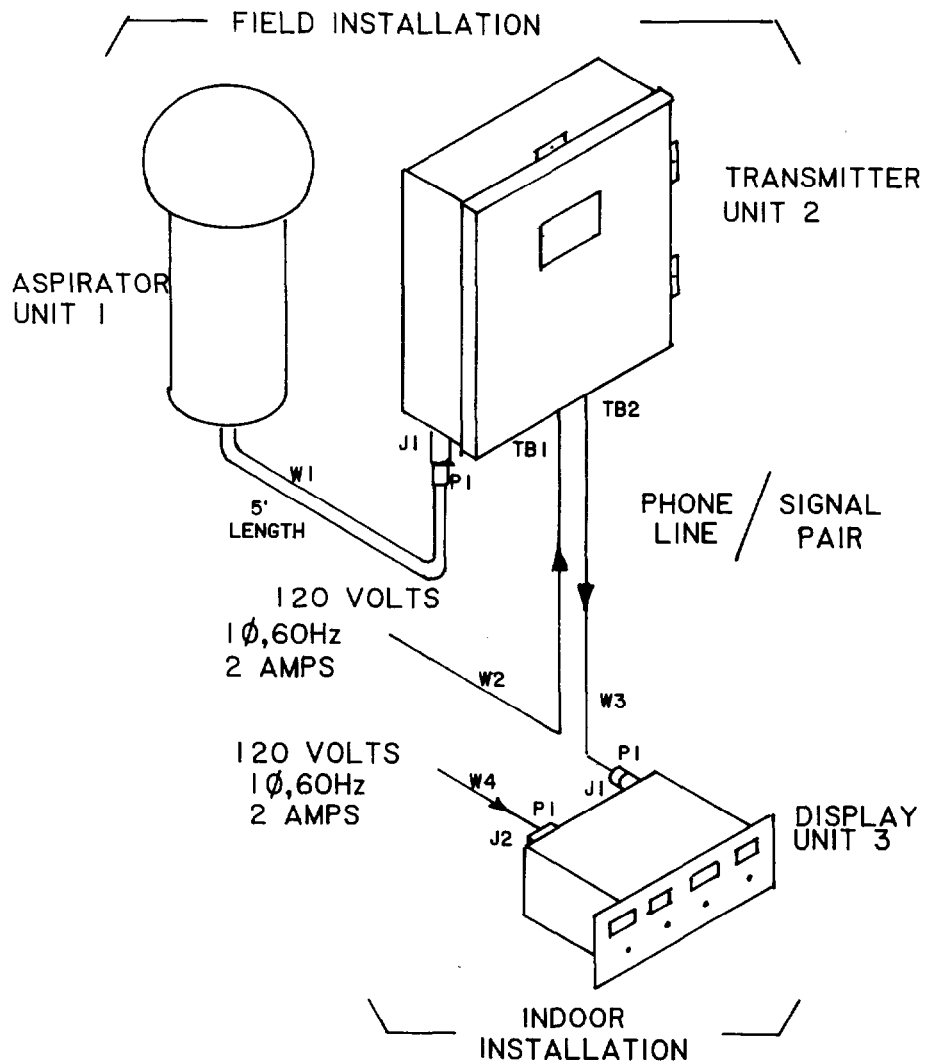
G. Equipment Support for Non-NWS Sites

The National Weather Service does not plan to support H060, H061, and H062 systems at FAA/FSS and LAWRS observation sites after the completion of all WSFO, WSO, and WSMO H083 installations.

The H063 system will be made available for use at FSS and LAWRS locations and NWS will provide logistics support for these systems.

H. Training for H083 Maintenance

1. Factory training was held at NWSTC, Kansas City, during July 1984.
2. Regular NWSTC training on the H083 will be incorporated into the SIMT course.



CABLE	TYPE	ACTIVE CO.	P1 MATES WITH	P1 TYPE	P2 TYPE
W1	#8774	14&SHLD.	2J1	MS3116F-16-26P	N/A
W2	SJ-14	2 & GND.	TB1	#6 LUGS	N/A
W3	22 GA. PR	2	3J1	91T-3260-1	#6 LUGS
W4	17500	2 & GND.	3J2	17500	N/A

NOTE: W1 IS FURNISHED WITH THE H083 AS A PART OF THE ASPIRATOR UNIT.

INTERCONNECT DIAGRAM

FIGURE 1

ASPIRATOR UNIT ASSEMBLY-HO83

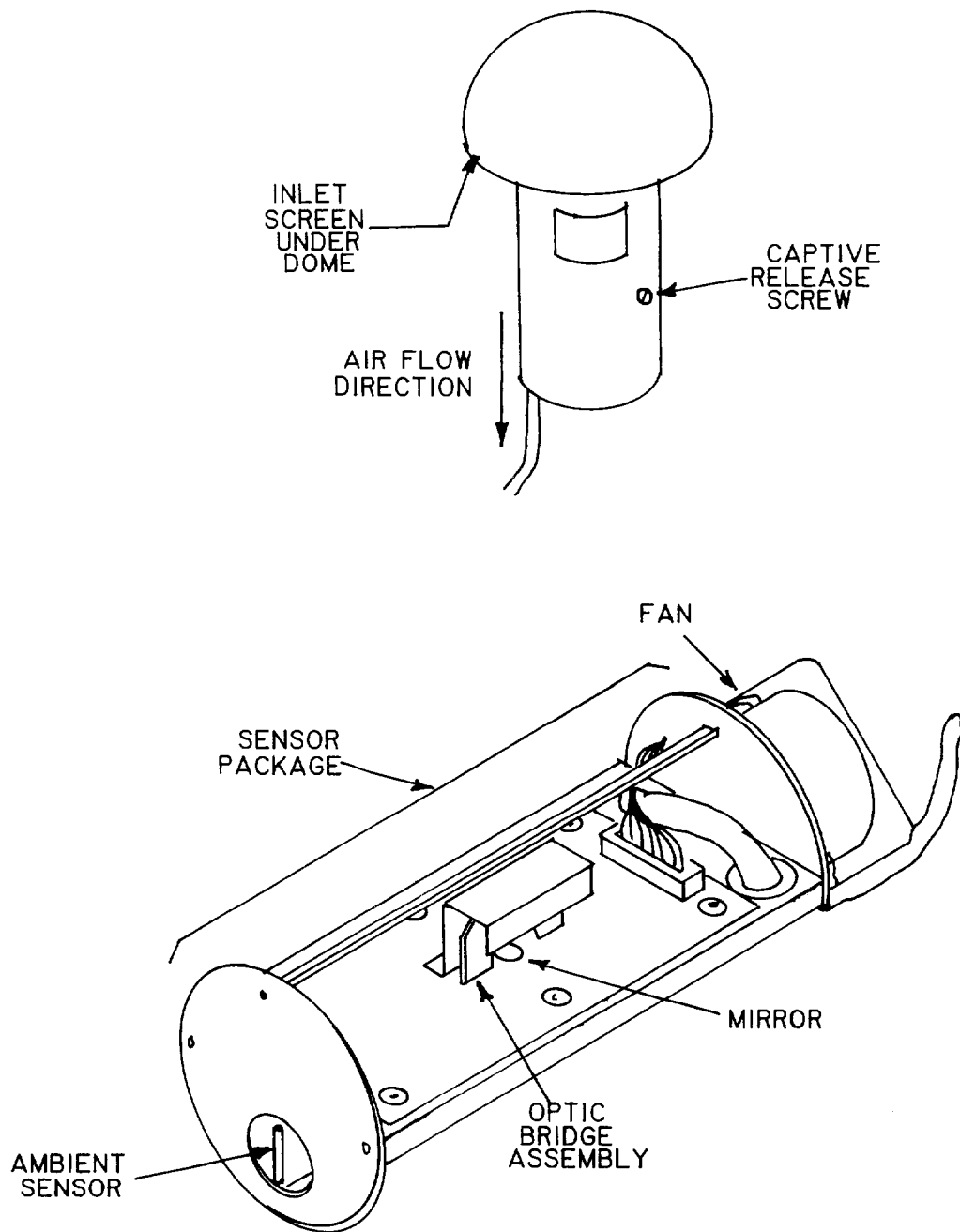


FIGURE 2

TRANSMITTER COMPONENT LAYOUT-H083

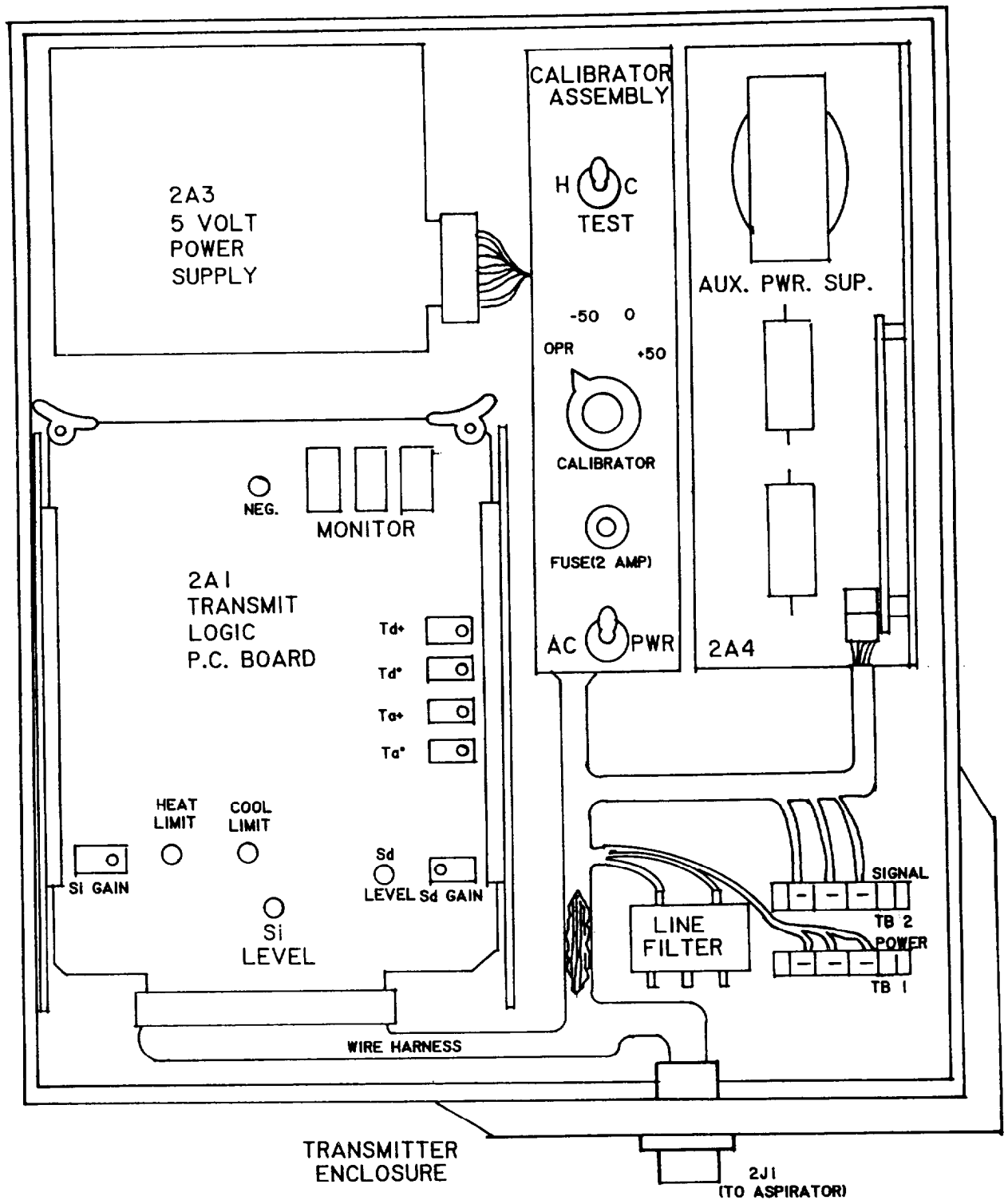
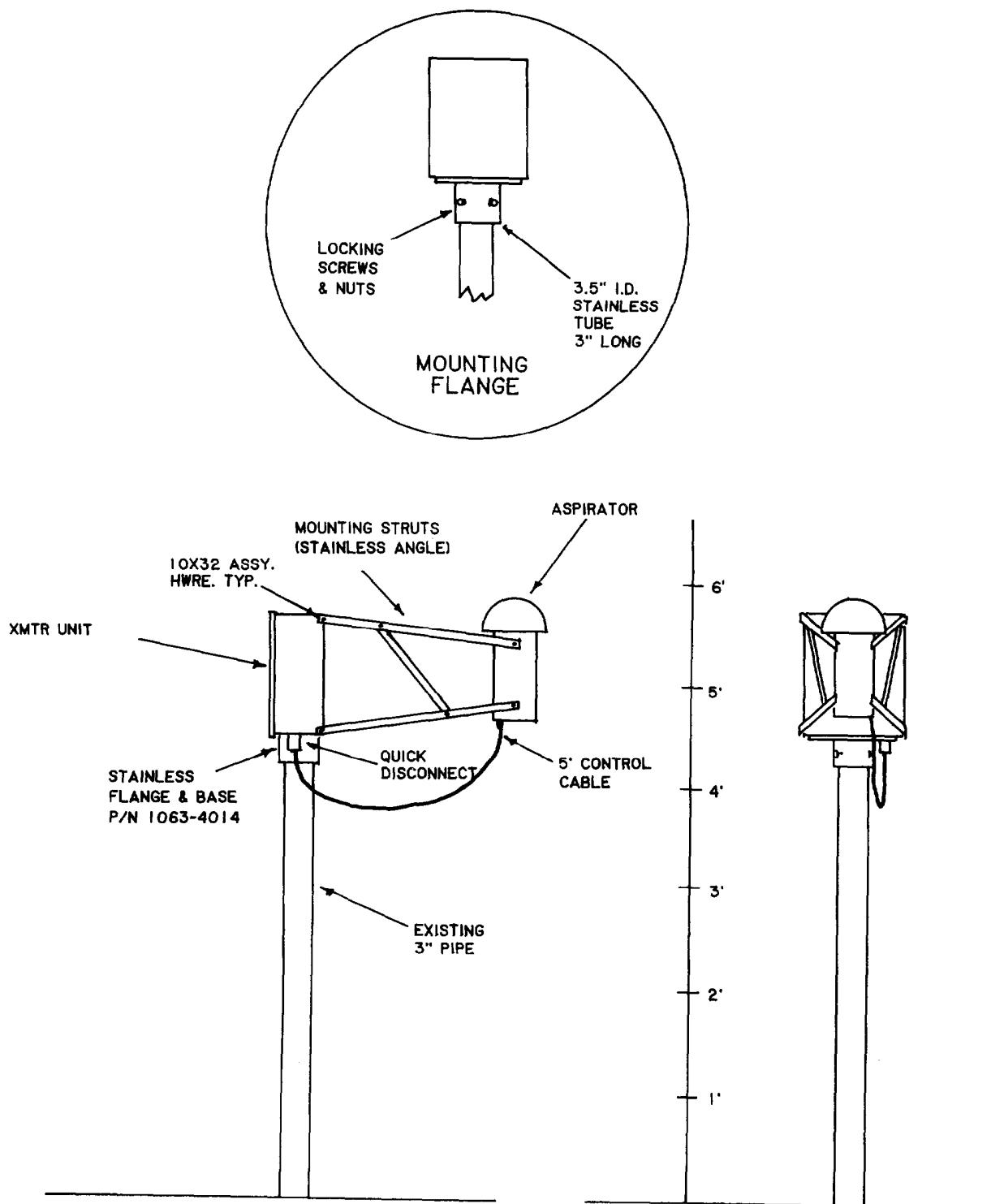


FIGURE 3



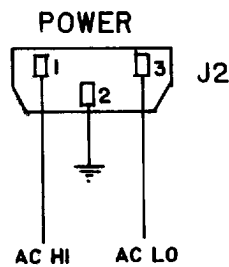
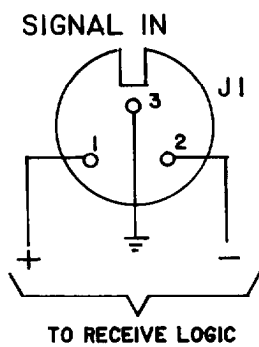
MOUNTING ARRANGEMENT

FIGURE 4

CABLING CONNECTIONS



TRANSMITTER TERMINAL BOARD CONNECTIONS
FIGURE 5A



BCD
OUTPUT
DATA *

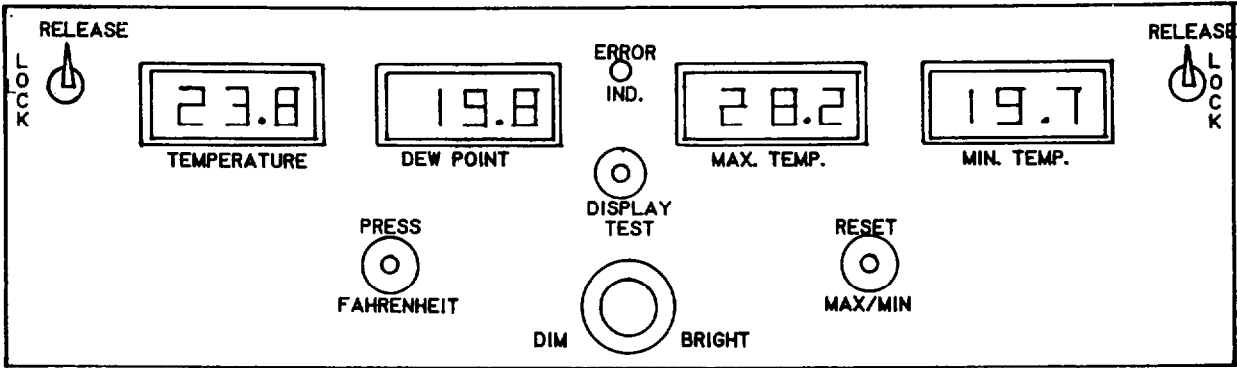
4	.1
3	.2
2	.4
1	.8
6	1
7	2
8	4
9	8
23	10
24	20
21	40
11	80
22	100
10	+
16	91
17	92
18	93
5	94
20	ERROR
14	+5VDC
15	COMMON
12	CELSIUS

DISPLAY UNIT CONNECTIONS-(J1-J2-J3)
FIGURE 5B

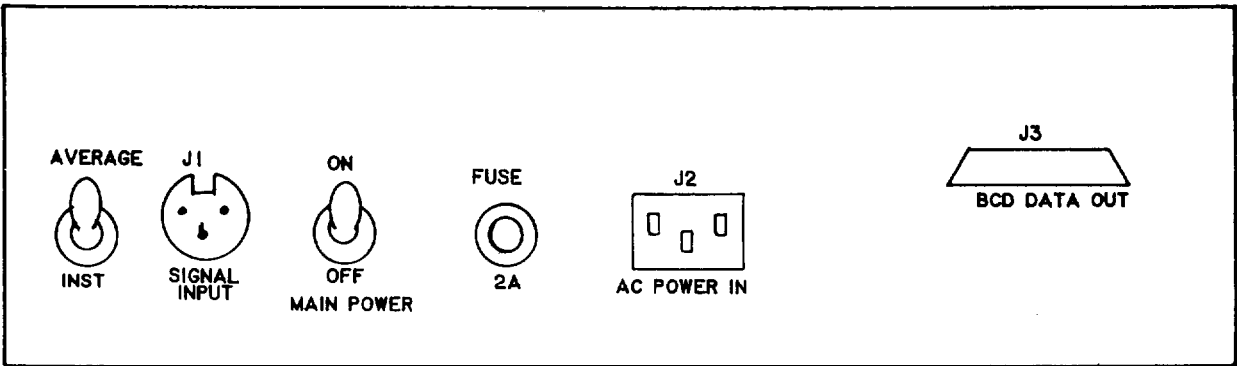
* UNUSED

FIGURE 5

DISPLAY UNIT - H083



FRONT PANEL



REAR PANEL

FIGURE 6

SPARE PARTS COMPLEMENT - H083

LRU ASSEMBLIES (1 EACH)

Dewpoint Sensor Assembly	1A1
Transmit Logic P.C. Board	2A1
Calibrator Assembly	2A2
+5 vdc Power Supply Assembly	2A3 and 3A2
Aux. Power Supply (Transmitter)	2A4
Receive Logic P.C. Board	3A1
Display +6 vdc Power Supply	3A3
Numeric Display P.C. Board	3A4A1 thru 3A4A4
DIP-to-"D" Jumper Assembly	3J3

OTHER PARTS (2 EACH)

Aspirator Fan	1B1
Plug, 15 Pin Female "D"	1P1 and 2X2
Plug, 26 Pin Male	1P2
Receptacle, 26 Pin Female	2J1
Switch, Toggle DPDT	2S1
Socket, Card Edge, 6 Pin	2X1 and 3X2
Socket, Card Edge, 22 Pin	2X3
Switch, SPDT, Momentary	2S2
Terminal Block, 3-Position	2TB1 and 2TB2
Fuse Holder, HKP	2XF1 and 3XF1
Fuse, 2 amp (312002)	2F1 and 3F1
Line Filter	2Z1
Socket, Card Edge, 10 Pin	3x3
Socket, Card Edge, 44 Pin	3x1
Receptacle, 3 Pin, Male	351
Filter/Receptacle, 115 VAC	3J2
Switch, DPDT, Toggle	3S1 and 3S5
Switch, Push-Button, DPST, NO	3S2 thru 3S4
LED Indicator (ERROR)	3DS1
Signal Plug (91-T-3260-1)	3P1
Potentiometer, 25K (RV6NAYSA253A)	3R1

FIGURE 7

H083 HYGROTHERMOMETER SYSTEM
Inventory Checklist

Aspirator Assembly

Housing	_____	1 ea.
Sensor Package	_____	1 ea.
W1 Cable Assembly	_____	1 ea.

Transmitter Unit

Housing	_____	1 ea.
Sleeve Attached?	_____	1 ea.
Internal Modules	_____	as req'd

Display Unit

Internal Modules	_____	as req'd
------------------------	-------	----------

Spares Chest

LRU's (1 ea.)		
Dew Point Sensor	_____	1 ea.
Xmit Logic P.C.	_____	1 ea.
Calibrator Assembly	_____	1 ea.
5 volt Power Supply	_____	1 ea.
Aux. Power Supply	_____	1 ea.
Receive Logic P.C.	_____	1 ea.
Display P.S. (+6v)	_____	1 ea.
Numeric Display P.C.	_____	1 ea.
DIP to "D" Jumper	_____	1 ea.
Piece Parts (2 ea.)		
(Refer to Figure 7)	_____	2 ea.

Accessories Kit

Display Line Cord	_____	1 ea.
Input Signal Plug	_____	1 ea.
BCD Mating Connector	_____	1 ea.
Mounting Struts	_____	6 ea.
Hardware Bag	_____	as req'd
Chassis Slides	_____	2 ea.
Hardware Bag	_____	as req'd

Manuals (FOMM)

Volume I - Support	_____	2 ea.
Volume II - Repair	_____	2 ea.

FIGURE 8

H083 HYGROTHERMOMETER SYSTEM
Accuracy Specifications

TEMPERATURE

<u>Operating Range</u>	<u>Maximum Error</u>
- 50° to + 50° C	±1.0° C
- 60° to - 51° C	±2.0° C
+ 51° to + 55° C	±2.0° C

DEW POINT

<u>Temp/Dewpoint Spread</u>	<u>-35° to -18° C</u>	<u>-18° to 0° C</u>	<u>Above 0° C</u>
0.0 to 5.5 C	2.5° C	1.9° C	1.1° C
5.6 to 6.5 C	2.5° C	1.9° C	1.1° C
6.6 to 7.5 C	2.5° C	1.9° C	1.2° C
7.6 to 8.5 C	2.5° C	1.9° C	1.2° C
8.6 to 9.5 C	2.5° C	2.0° C	1.3° C
9.6 to 10.5 C	2.5° C	2.1° C	1.4° C
10.6 to 11.5 C	2.5° C	2.3° C	1.5° C
11.6 to 12.5 C	2.5° C	2.5° C	1.6° C
12.6 to 13.5 C	2.8° C	2.8° C	1.7° C
13.6 to 14.5 C	3.0° C	3.0° C	1.8° C
14.6 to 15.5 C	3.2° C	3.2° C	1.9° C
15.6 to 16.5 C	3.5° C	3.5° C	2.0° C
16.6 to 18.5 C	3.7° C	3.7° C	2.1° C
18.6 to 22.5 C	4.4° C	4.4° C	2.5° C
22.6 to 27.5 C	5.5° C	4.4° C	3.1° C
27.6 to 32.5 C	6.6° C	6.6° C	3.75° C
32.6 to 35.0 C	7.7° C	7.7° C	4.4° C

FIGURE 9

EXPOSURE GUIDELINES -- WSOM CHAPTER B. 11

3.5 Siting and Exposure of Temperature Sensors. Locate the sensors:

- a. over level terrain (earth or sod) that is typical of the area around the station.
- b. at least 100 feet from any extensive concrete or paved surface and at least 500 feet from any structure, building, or area that might influence readings, e.g., jet-blast areas, cooling towers, etc.

In considering possible sites, avoid areas where rough terrain or air drainage would result in nonrepresentative temperature data. Avoid swampy locations or other areas where water tends to collect and remain after precipitation and areas subject to artificial irrigation. Also avoid areas where frequent drifting of snow occurs. At locations where the temperature sensors are to be mounted within an instrument shelter, position the shelter so that it opens to the north in the Northern Hemisphere with the floor 4 to 6 feet above the ground. In the case of remoted sensors not exposed in instrument shelters, e.g., the hygrothermometer, mount the device so that the air intake is 4 to 6 feet above the top of the snow.

If, however, the temperature data are required primarily for a special purpose, that purpose should determine the exposure. For example, if the temperature affecting a low-lying crop is required, the temperature sensor should be exposed at the level of the crop, or if temperature and dewpoint affecting aircraft operations are required, the sensors may be exposed closer to paved areas than generally desirable.

3.5.1 Maintenance of Temperature Sensor Site. It is essential that the temperature sensors have an unobstructed flow of air. Keep grass or other vegetation within 100 feet of the sensors clipped to a height of less than 10 inches.

VERIFICATION OF INSTALLATION
H083
HYGROTHERMOMETER SYSTEM

1. DATE INSTALLED _____ DATE ACTIVATED _____
2. H-30 DOCUMENT # _____ USED TO REPORT ACTIVATION TO EMRS
3. COMPLETE SYSTEM SERIAL NUMBER _____
4. NAME(S) OF ELTECH(S) PERFORMING INSTALLATION/ACTIVATION:

5. TYPE OF HYGROTHERMOMETER DE-ACTIVATED _____
COMPLETE SERIAL # _____
LOCATION OF SYSTEM _____
6. IF YOU HAVE REGIONAL DISPOSITION INSTRUCTIONS FOR YOUR OLD
HYGROTHERMOMETER, PLEASE DETAIL BELOW

7. DATE OLD DEWCELS RETURNED TO NRC - KANSAS CITY _____
OPERATIONAL DEWCEL SERIAL # _____ H-30 OR H-14 # _____
SPARE DEWCEL SERIAL # _____ H-30 OR H-14 # _____
8. DID YOU ENCOUNTER ANY DIFFICULTIES DURING INSTALLATION OF
THE H083 SYSTEM? Y N IF YES, DETAIL ON REVERSE.
9. ELTECH COMPLETING THIS VERIFICATION _____
SIGNATURE _____
10. STATION ID _____ ORG CODE _____

Mail this form to: NWS Engineering Division
W/OTS141 - Thom Cavanagh
8060 13th Street
Silver Spring, Maryland 20910

VERIFICATION OF RECEIPT OF H083 EQUIPMENT

Please complete the sections below immediately
upon receipt, unpacking, and inventory of equipment.

1. DATE RECEIVED _____ SHIPPER _____
2. CONTAINER DAMAGED? Y N
3. CONTENTS DAMAGED? Y N
(IF YES, DESCRIBE EXTENT OF DAMAGES BELOW)
4. COMPLETE SYSTEM SERIAL NUMBER _____
5. INVENTORY COMPLETED? Y N
(IF ANY ITEMS ARE MISSING, DESCRIBE BELOW)
6. ELTECH'S NAME _____ SIGNATURE _____
7. STATION ID _____ ORG CODE _____

Mail this form to: NWS Engineering Division
 W/OTS141 - Thom Cavanagh
 8060 13th Street
 Silver Spring, Maryland 20910

H083 - ALIGNMENT

I. Test Equipment & Tools Required

Hand Tools (normal station issue) including TRIMPOT adjusting tool(s)

Digital Volt Meter

Backup Standard Thermometers

II. Display Unit Test

- A. Depress DISPLAY TEST. All light segments of each of the four displays should illuminate, indicating a value of - 188.8.
- B. Rotate DIMMER CONTROL. Intensities of each display should vary from dim to bright.
- C. Using a Digital Voltmeter, measure the power supply voltage at Test Point 3X2-6. Meter should indicate +5.0 volts ($\pm 0.1V$).

III. Transmitter Unit Test

A. Sensor Package Inspection

Release the sensor package from the aspirator shell by removing the knurled captive screw at the side of the shell. Carefully slide the sensor package down and out of the shell. Examine the surface of the mirror for film and particles of dirt. If necessary, clean the mirror using isopropyl alcohol. The mirror should be wiped carefully with a cotton swab. When the mirror is completely clean, replace the sensor package.

B. Transmitter Power Checks

- 1. Restore Power to the transmitter.
- 2. Verify that L.E.D. monitor illuminates (the display will first indicate 'FFF', and then assume a temperature value).
- 3. Ensure that the aspirator blower is running, and that the direction of air flow is downward through the housing.

4. Using a digital voltmeter, measure the power supply voltage at:

2X3- 10	+	5.0 v	(\pm 0.3 v)
2X3- 6	+	12.0 v	(\pm 0.5 v)
2X3- 12	-	12.0 v	(\pm 0.5 v)

C. Optic Loop Adjustments

1. Verify that the CALIBRATOR switch is in the 'OPERATE' position.
2. Observe and note the ambient (Ta) and dew-point (Td) values on the monitor display. (These are Fahrenheit readouts).
3. With the Monitor Display Switch in the Td position, depress the HEAT Switch. Td should increase at a rate of about 2 degrees per second. Keep the heat switch depressed until Td is between 20 and 30 degrees above Ta.
4. At some point during this increase, the Sd LEO (CR-5) should illuminate. Release the HEAT switch and adjust the Sd TRIMPOT (R-21) CCW until CR-5 extinguishes. Immediately adjust R-21 CW until the LEO just illuminates (set at threshold).
5. Adjust the Indirect Sensor (Si) gain TRIMPOT (R22) CW until the Si LED (CR-9) just illuminates. Then, carefully re-adjust R-22 until CR-9 extinguishes.
6. After the Td value on the Display Monitor has stabilized, verify that both LIMIT LEDS (CR-6 & CR-7) are OFF. The Sd LED (CR-5) should be off, and the Si LED (CR-9) should be ON.

D. Instrument Calibration

1. Place CALIBRATOR switch in the '0' Position (0 degrees C = 32 F)

Observe and note the Ta and Td values on the monitor display. Both should indicate 32.0 (\pm 0.2) degrees.

Adjust TA0 TRIMPOT (R-35) for Ta.

Adjust TD0 TRIMPOT (R-52) for Td.

2. Place CALIBRATOR switch in the '+50' position (50 degrees C = 122.0 F) Again, observe Ta and Td values on the MONITOR DISPLAY. (22.0 ± 0.2 degrees).

Adjust TA+ TRIMPOT for Ta (R-34)

Adjust TD+ TRIMPOT for Td (R-51)

3. Place CALIBRATOR switch in the '0' position. Verify that Ta and Td indicate 32.0 (± 0.2) as in step 1 above (repeat steps 1-3 as necessary)
4. Place CALIBRATOR switch in the '-50' position. Verify that Ta & Td indicate -58.0 (± 0.5) degrees.
5. Place CALIBRATOR switch in the 'OPER' position.

IV. TEMPERATURE/DEWPOINT COMPARISON

- A. Perform comparison measurements at the sensor (field site) location using standard (sling psychrometer) backup thermometers.
- B. Verify that Ta and Td readings are within the prescribed tolerances detailed in Figure 9 of the T.I.P.

V. TRANSMITTER/DISPLAY UNIT CHECKS

(NOTE:) The following checks require one person at the Transmitter location, and one person at the display unit.

A. Error Indication

1. Disconnect the input signal cable (P1) on the rear of the Display Unit. The error indicator should flash continuously. All four display (Ta, Td, Tmax, and Tmin) should remain exactly as they were before P1 was disconnected. Reconnect P1.
2. Hold the transmitter HEAT/COOL switch in the HEAT position. The error indicator should flash. Release the HEAT/COOL switch. Within a few seconds, the Td measurement will stabilize, and the error indicator will extinguish.
3. Place the CALIBRATOR switch in one of the three test positions (-50, 0, +50). The error indicator should flash periodically until the displayed values of Ta and Td are within approximately two degrees of the test value.

4. Place the AVERAGE/INSTANTANEOUS switch at the rear of the display unit in the Instantaneous Position. The error indicator should flash continuously.

B. Tmax and Tmin Tests

1. RESET Tmax and Tmin by depressing the RESET and FAHRENHEIT DISPLAY switches simultaneously. Verify that the Tmax & Tmin displays assume the current value of Ta (± 0.2).
2. Place the CALIBRATOR switch at the transmitter unit in the '+50' position. Wait 6 minutes.
3. Place the CALIBRATOR switch in the '-50' position. Wait 6 minutes.
4. Place the CALIBRATOR switch in the 'OPERATE' position. Verify that the Tmax and Tmin displays indicate 50.0 (± 0.3) and -50.0 (± 0.3) degrees respectively.
5. Reset Tmax and Tmin. Verify that the displays indicate the same as Ta (± 0.2).



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

April 4, 1986

W/OTS14 - WDH

TO All NWS Regional Headquarters. Area Electronics
Supervisors, and Electronics Technicians
(EHB-8 Distribution)

FROM J. Michael St. Clair *J. M. St. Clair*
Chief, Engineering Division

SUBJECT Transmittal Memorandum for Engineering
Handbook No. 8, Issuance 86-2

1. Material transmitted:

Engineering Handbook No. 8, Surface Equipment, Section ^{2.4}~~2-8~~,
Hygrothermometer (H083), Maintenance Note #1: Dewpoint
Sensor Assembly 0 Ring Seal.

2. Summary:

Experience has shown that under humid conditions water droplets will form, running into the connector and affecting the accuracy of the measurement. This maintenance note provides information to install an 0 Ring Seal on the card mounted connector attached to the Dewpoint Sensor Assembly.

3. Effect on Other Instructions:

None.

EHB- 8
Issuance 86- 2



H083 Maintenance Note No. 1
(For Electronics Technicians)

1.0 Dewpoint Sensor O Ring Seal Installation.

General:

This maintenance note contains instructions to correct the problem of moisture running into connector J1 on the dewpoint sensor board by installing an O Ring Seal between J1 and its mating connector.

EQUIPMENT,

TOOLS REQUIRED: Standard complement of tools

REFERENCE

DOCUMENTATION

REQUIRED : See Figure 1

PROCEDURE:

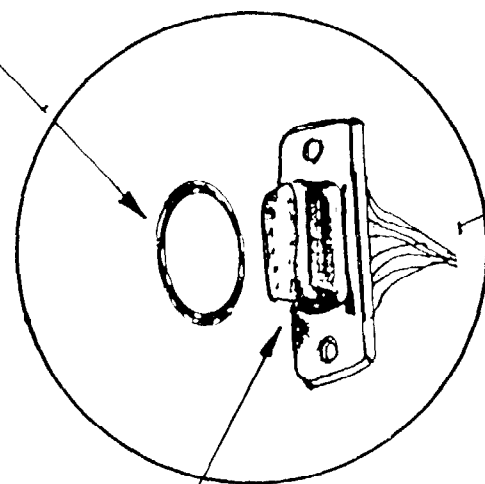
1. Open the transmitter door on the H083 and switch the main power off.
2. Unscrew the captive release screw on the aspirator and remove the aspirator from the cover, this reveals the dewpoint sensor assembly.
3. Remove the two screws that hold the 15-pin "D" sensor plug, see Figure 1.
4. Use a small amount of silicone grease and completely coat the square "O" Ring.
5. Slip the square "O" Ring over the plug and squarely seat the ring at the bottom of the plug on the flange.
6. Replace the plug and secure with screws. Do not over tighten screws and distort "O" Ring.
7. After the plug is in place replace the aspirator and power up the transmitter unit.

EHB-8

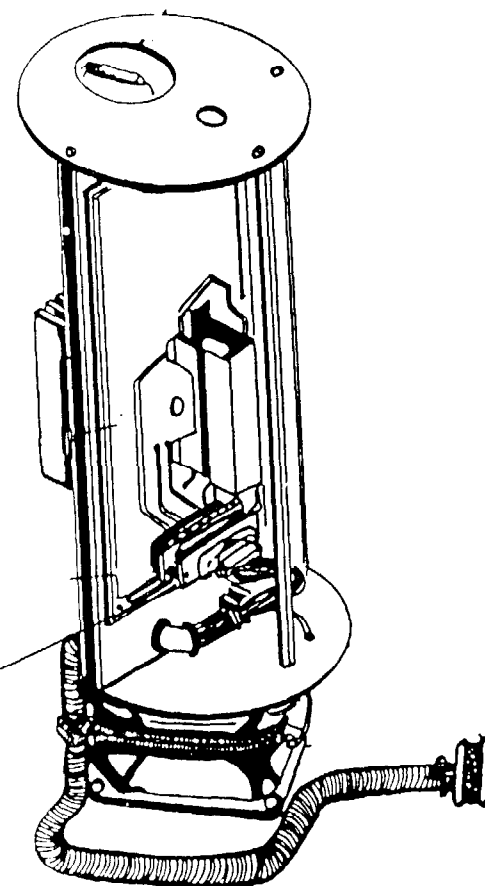
Issuance 86- 2

4-4-86

SQUARE "O" RING MP1



15-PIN "D" PLUG



ASPIRATOR UNIT

FIGURE 1



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

July 16, 1986

W/OTS141 - WDH

TO: All NWS Regional Headquarters, Area Electronics Supervisors,
and Electronics Technicians (EHB-8 Distribution)

FROM: W/OTS1 - J. Michael St. Clair

SUBJECT: Transmittal Memorandum for Engineering Handbook No. 8, Issuance 86-6

1. Material Transmitted:

Engineering Handbook No. 8, Surface Equipment, Section ^{2.4}~~2.8~~, Hygrothermo-
meter (H083) Maintenance Note 2: Transmitter Box Door Seal Repair.

2. Summary:

During the assembly of the H083 transmitter box, some of the door seals were improperly installed, resulting in water leaking into the box. This maintenance note provides information instructing the technician to use an RTV compound to close the gap between adjacent door seals in the transmitter, if you have an improperly installed seal.

3. Effect on Other Instructions:

None.

EHB-8
Issuance 86- 6

